Unraveling The Enigma Of Nintendo’s Virtual Boy, 20 Years Later

How the 1990s VR craze inspired an infamous–and still misunderstood–failed video game console.

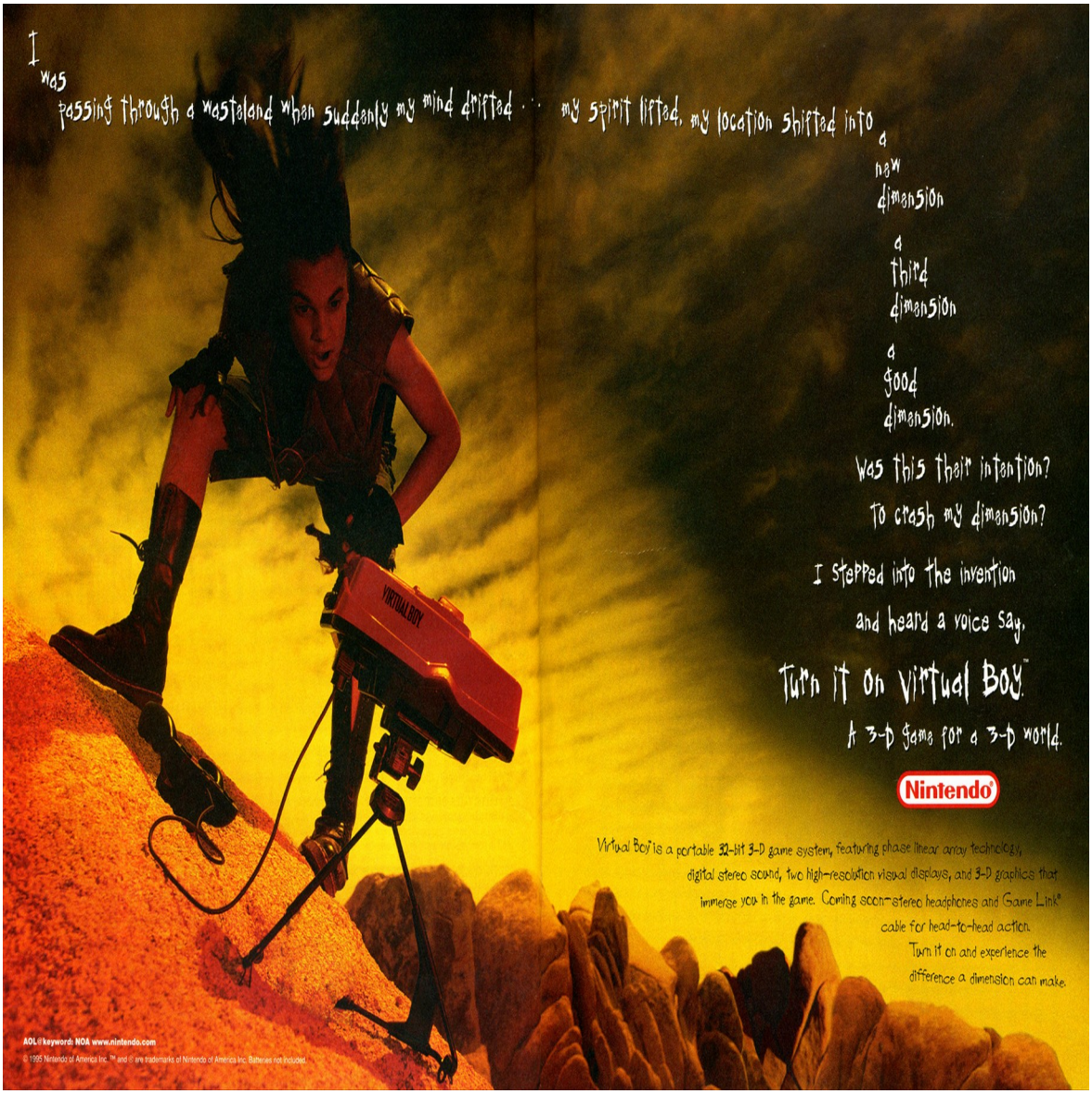
BY Benj Edwards

The **Virtual Boy** and its controller. **Photo**: Benj Edwards

Twenty years ago, on August 21, 1995, Nintendo released the Virtual Boy in North America. The stilt-legged tabletop gaming console, which offered a unique red stereoscopic 3D display, attempted to ride a wave of popular interest in virtual reality. It was a risky, innovative gamble for Nintendo that didn't pay off, leaving many to wonder why it existed in the first place.

According to some reports, the Virtual Boy sold roughly 770,000 units worldwide during its brief life span–and only 140,000 units in its native Japan. That might qualify as a success for a boutique toymaker, but by the 1990s, Nintendo had grown accustomed to megahits. The firm's last console before the Virtual Boy, the Super Famicom, had sold at least 20 million units worldwide by 1995. The NES sold 61.9 Million units. The Game Boy, 40 million. And there, in the middle of this streak was the Virtual Boy with its statistically insignificant numbers. Those are the kinds of sales numbers Nintendo could rack up accidentally by coughing into a manufacturing plant.

Between Nintendo's disinheritance of the platform and the death of its primary creator in a traffic accident in 1997, the Virtual Boy invites speculation, rumor, and myth like no other console. Why were red and black the only colors it could display? Did it cause headaches? Did it damage people's vision? Where were the good games? Why didn't it strap onto your head?


I was passing through a wasteland when suddenly my mind drifted . . . my spirit lifted, my location shifted into a new dimension
a third dimension
a good dimension.
Was this their intention?
To crash my dimension?
I stepped into the invention
and heard a voice say,
Turn it on Virtual Boy.
A 3-D game for a 3-D world.
Nintendo
Virtual Boy is a portable 32-bit 3-D game system, featuring phase linear array technology, digital stereo sound, two high-resolution visual displays, and 3-D graphics that immerse you in the game. Coming soon-stereo headphones and Game Link® cable for head-to-head action.
Turn it on and experience the difference a dimension can make.
AOL® keyword: NOA www.nintendo.com
© 1995 Nintendo of America Inc. ™ and ® are trademarks of Nintendo of America Inc. Batteries not included.
A 1995 Virtual Boy magazine ad

Despite the name, there is one thing that Virtual Boy is not: virtual reality. The system was conceived during a period of fascination with VR and was originally intended to be a headset, akin to a proto-Oculus Rift. But 1995 technology was not up to the job of generating immersive worlds. As a result, the console has often been the recipient of unfettered scorn from fans and critics alike. With no defense coming from Nintendo, who swept it under the rug long ago, the Virtual Boy has become video game history's favorite whipping boy.

Advertisement

Still, the system typifies Nintendo's historical willingness to take innovative risks. Sometimes these bets succeed splendidly (Wii, Nintendo DS), and sometimes they don't (Wii U). But the ones that don't pay off are just as fascinating as the ones that do. That makes the Virtual Boy worth examining in

more detail, especially since its negative baggage typically obscures the story of its creation. It’s an intriguing tale about entrepreneurship, invention, East-West cultural relations, and the price of relentless invention.

A Screen Of One’s Own

Nintendo may be a quintessentially Japanese company, yet the story of Virtual Boy begins not in Japan, but in Cambridge, Massachusetts, U.S.A. In 1985, when Nintendo had not yet conquered North America with its Nintendo Entertainment System, an engineer named Allen Becker came up with a clever idea.

Allen Becker at his desk at Reflection Technology Photo: courtesy of Mary Swartz

Wouldn’t it be nice, Becker thought, while crunched in an uncomfortably small commercial airline seat, to have a small, sharp, high-resolution display attached to a portable computer? A display that you could easily use on flights, without too much battery drain?

At that time, the most popular laptop computers included low-res displays, which rendered blocky monochrome graphics in hues of murky greenish-gray–if they did graphics at all. The displays weren't very big, they typically weren't legible in low-light conditions, and they morphed into a blurry stew of blue or green when displaying motion.

CRT technology was too power hungry to cram into a small package with a reasonable battery life.

The obvious alternatives weren't suitable: CRT technology was too power hungry to cram into a small package with a reasonable battery life, and reasonably inexpensive color LCDs with sufficient resolution and power requirements were half a decade off. In Becker's mind, that left only LEDs, which were cheap, plentiful, and inexpensive. But how could he incorporate them into a portable display?

A key insight came from Becker's long history in the New England tech sector. In 1974, he had worked with now-legendary technologist Ray Kurzweil at Kurzweil Computer Products during the invention of the first flatbed scanner. Their scanner was conceived as part of Kurzweil's reading machine for the blind, an extraordinary device which also packed breakthrough technologies for optical character recognition and voice synthesis. It used a single line of 500 light sensitive diodes to sweep across a page, line by line, in a manner that could later be reconstructed into a two-dimensional digital image by a computer.

With this technique brewing in his mind, Becker conceived of a display that consisted of a single line array of LEDs that could optically "print" a persistent image onto a person's retina by changing the pattern of lights that lit up while sweeping across a given area. But instead of moving the LEDs themselves, he decided to move a reflection of the LEDs–with a mirror that oscillated back and forth 50 times a second. He called his device the Scanned Linear Array (SLA), and due to the nature of LEDs, it could present a very bright, very sharp image at a high resolution for a potentially low price if mass-produced.

Lacking the capital to fabricate his own arrays, Becker looked around for existing tech to fill his needs. He found what he was looking for in an array manufactured by AEG Telefunken for very large format printers. Since red LEDs were a mature, cheap technology, they were what printers used, and what Becker was stuck with. That meant that his display would only be capable of displaying red graphics on a black background.

Reflection’s Nate Goldshlag (left) and Allen Becker playfully test the Private Eye
Photo: courtesy of Mary Swartz

In about six months, Becker pieced together a SLA prototype and picked up a first round of investment money from New England tech cohorts like former partner Ray Kurzweil and the director of the MIT Media Lab, Nicholas Negroponte, which gave his project instant tech credibility. In 1986, Becker formed Reflection Technology, Inc. (a reference to his clever use of vibrating mirrors) along with Neil Golden, an experienced salesman who helped with the business plan, Benjamin Wells, a Polaroid veteran would serve as Chief Scientist

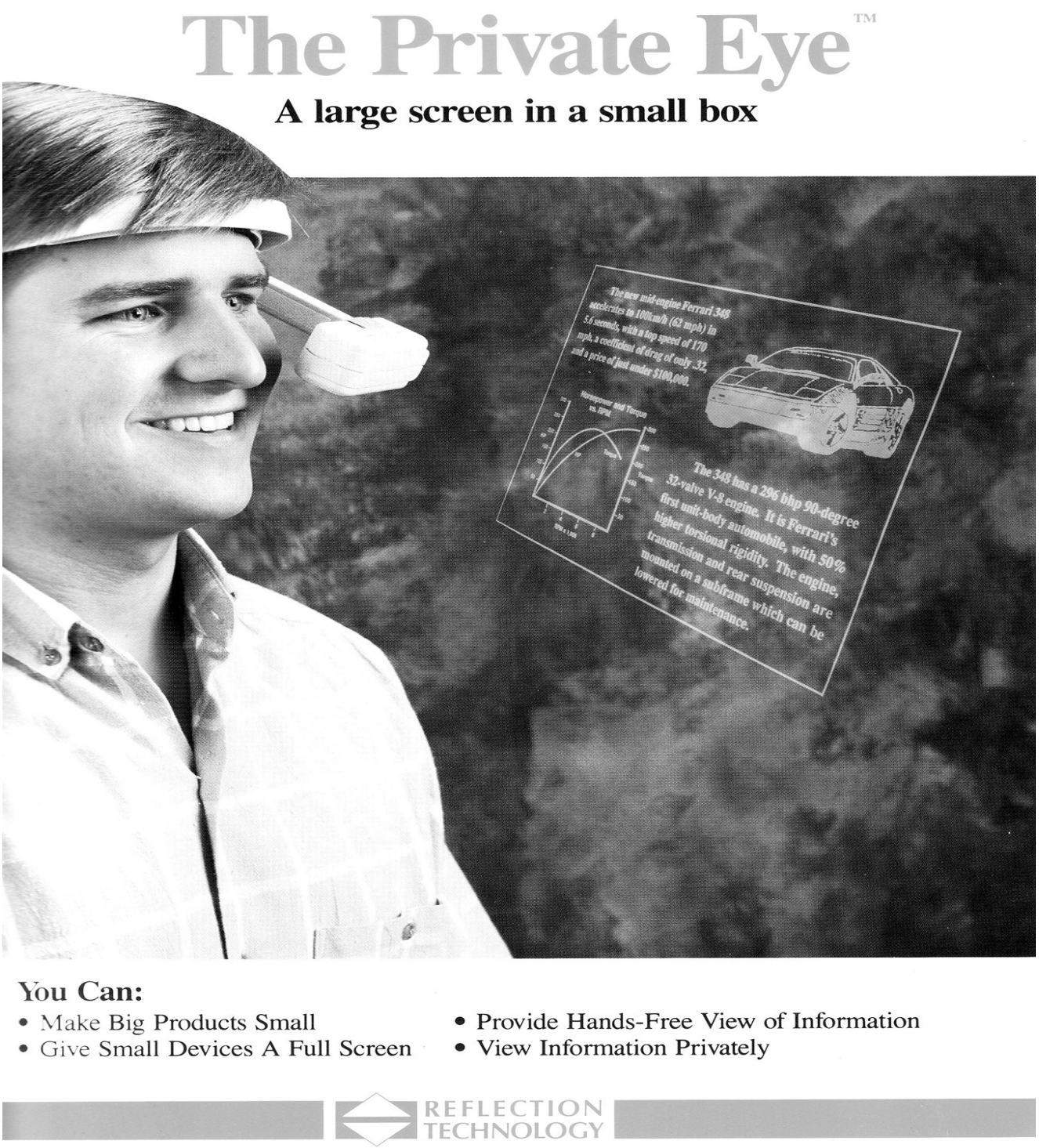
of Becker’s new firm, and ex-Kurzweil engineer Nate Goldshlag, who became Director of Electronics.

To fill out the roster, Becker hired a mechanical engineer named Greg Hunter and an accountant. The crew set up shop in the basement of a former bakery in Cambridge, which had retained a baked-goods aroma. “You smelled bread every day when you were working,” says Steve Lipsey, Reflection’s VP of Sales and Marketing, who joined in 1987.

The group worked together to miniaturize Becker’s prototype. They came up with a 1″ display capable of simulating a 12” display as seen from 18 inches away. They called it the Private Eye.

Becker envisioned the Private Eye as a mobile, minimally distracting way of viewing information when you needed both hands free to do other work. Neil Golden and Lipsey worked up sales literature that described scenarios like doctors checking vital signs or MRI scans with the Private Eye during surgery, and aircraft technicians referencing technical manuals as they lay on their backs, hands clutching greasy tools.

A rather rudimentary Private Eye prototype Photo: courtesy of Ben Wells


The Private Eye™
A large screen in a small box
The new mid-engine Ferrari 348 accelerates to 100km/h (62 mph) in 5.6 seconds, with a top speed of 170 mph, a coefficient of drag of only .32, and a price of just under $100,000.
The 348 has a 296 bhp 90-degree 32-valve V-8 engine. It is Ferrari's first unit-body automobile, with 50% higher torsional rigidity. The engine, transmission and rear suspension are mounted on a subframe which can be lowered for maintenance.
You Can:
• Make Big Products Small
• Give Small Devices A Full Screen
• Provide Hands-Free View of Information
• View Information Privately
REFLECTION TECHNOLOGY

Reflection's Private Eye, looking a little like a proto-Google Glass

Seeking someone to license the technology, Golden and Lipsey traveled the world, making calls and visiting companies to give live demonstrations of the new display. They focused on potential medical, military, industrial, and entertainment applications. They racked up a few early successes: Hughes

Aircraft began licensing the Private Eye as a heads-up display, and a handful of mom-and-pop PC makers announced their intention to create portable computers that utilized the display. (None of them made it to market.)

Then Reflection got its big break at the Fall 1988 COMDEX show in Las Vegas, where several publications selected the Private Eye as one of the must-see gadgets at the show. The appearance generated immense press attention–including prominent features in *Popular Science* and *Popular Mechanics*–and brought in thousands of potential sales leads.

The tech media hailed the Private Eye as the future of computer displays, introducing the concept of wearable computing to the mainstream and presaging modern augmented-reality projects such as Google Glass and Microsoft's HoloLens. Reflection responded to the intense interest by selling the Private Eye in a development kit along with a headband and a computer interface board at $5,000 a pop. Lipsey says they sold about 75 to 100 of these kits, generating income for the tiny company.

Reflection’s Nate Goldshlag tests the Private Eye display in sunlight Photo: courtesy of Mary Swartz

And yet selling the Private Eye could be frustrating. Everywhere Lipsey went, he witnessed enthusiasm for the product, but few firms went past the exploration stage. He would often encounter a sympathetic engineer who would champion the Private Eye to upper management. Excitement would persist for a while, then things would fizzle out. “They failed to find a killer app for our display,” says Wells.

An Entertainment Breakthrough

In the early 1990s, “virtual reality” became a major buzzword in the American tech media. The term implies a simulated presence in a computer-generated world–one that can fool viewers into feeling like they’re actually there.

An early-’90s NASA photo showing VR at work

At that time, readers of tech magazines found themselves confronted with colorful images of headsets that enveloped users’ field of vision and promised to transport them to fantastical worlds. Even NASA got into the game, founding its own VR research lab in 1990. The concept met an even wider audience thanks to the 1992 film *The Lawnmower Man*. It felt like the next step in technological evolution.

I don’t recall anybody literally throwing up in the office, but I think we were lucky.

Steeped in that atmosphere, around 1990, the engineers at Reflection put together a video game demo using two Private Eye units mounted to a welder’s mask. They attached a primitive head-tracking apparatus that monitored the

movement of the wearer’s head. The dual displays linked up to a luggable IBM PC-compatible computer that ran a tank simulation game.

In the game, the player witnessed a first-person view from a tank window, which looked out upon a desert terrain with pyramids. The goal was to shoot enemy tanks. “It was incredible,” recalls Lipsey. “We played it all the time, and I’m not a video gamer. It was very psychologically powerful to put that thing on.”

Steve Lipsey at Reflection Technology, circa late 1980s Photo: courtesy of Mary Swartz

In essence, the firm had created a prototype of a very inexpensive virtual-reality headset. This convinced Reflection to double down on selling to toy and video game companies. Lipsey spent a considerable amount of time shuttling between New England and Mattel’s headquarters in California as engineers there deliberated over using the technology. Hasbro also gave it a whirl. Neither discussion went anywhere.

Selling The Screen

In the early 1990s, as Reflection tried to find customers for its Private Eye display technology, toymaker Mattel took particular interest in researching its entertainment prospects. Lipsey soon found himself spending a significant amount of time at the firm's headquarters. No stranger to military security, he says that Mattel's R&D labs were harder to gain entry to than the Pentagon. "Once you got through all the various doors, basically there's a room full of guys who spent most of their day playing elaborate practical jokes on each other," he says.

Among his more bizarre sales calls, Lipsey recalls spending the day with counterculture psychologist and drug advocate Timothy Leary at his house in Northern California. "He was, of course, very interested in anything that would take you to another place," says Lipsey. During that afternoon, Leary was impressed by Reflection's far-out virtual reality tank game. It was a drug-free way to expand his consciousness.

As powerful as it was, the head-tracking game demo did have its drawbacks. Wells remembers: "The whole point of the tank demo was to demonstrate head tracking. As you turned your head to the right, what you saw moved by a corresponding amount." But if you introduced a perceptible delay between your head's movement and the view on the screen, the display could induce motion sickness. (Two decades later, Oculus and other makers of modern-day VR systems must deal with the same issues.) "If memory serves me, we were always on the 'too slow' side of the vomit point," says Wells. "I don't recall anybody literally throwing up in the office, but I think we were lucky."

Others were apparently not so fortunate. "A big issue was kids got sick, threw up, or fell over when using this," remembers Tom Kalinske, the former president of Sega of America, which encountered the Private Eye while reviewing potential

VR technology in the early 1990s. “We couldn’t take that chance.” But that wasn’t the only downside Sega saw. “As I recall, our problem with it was it was just one color,” says Kalinske. “We were already promoting Game Gear in all colors.”

Now You’re Playing With Power

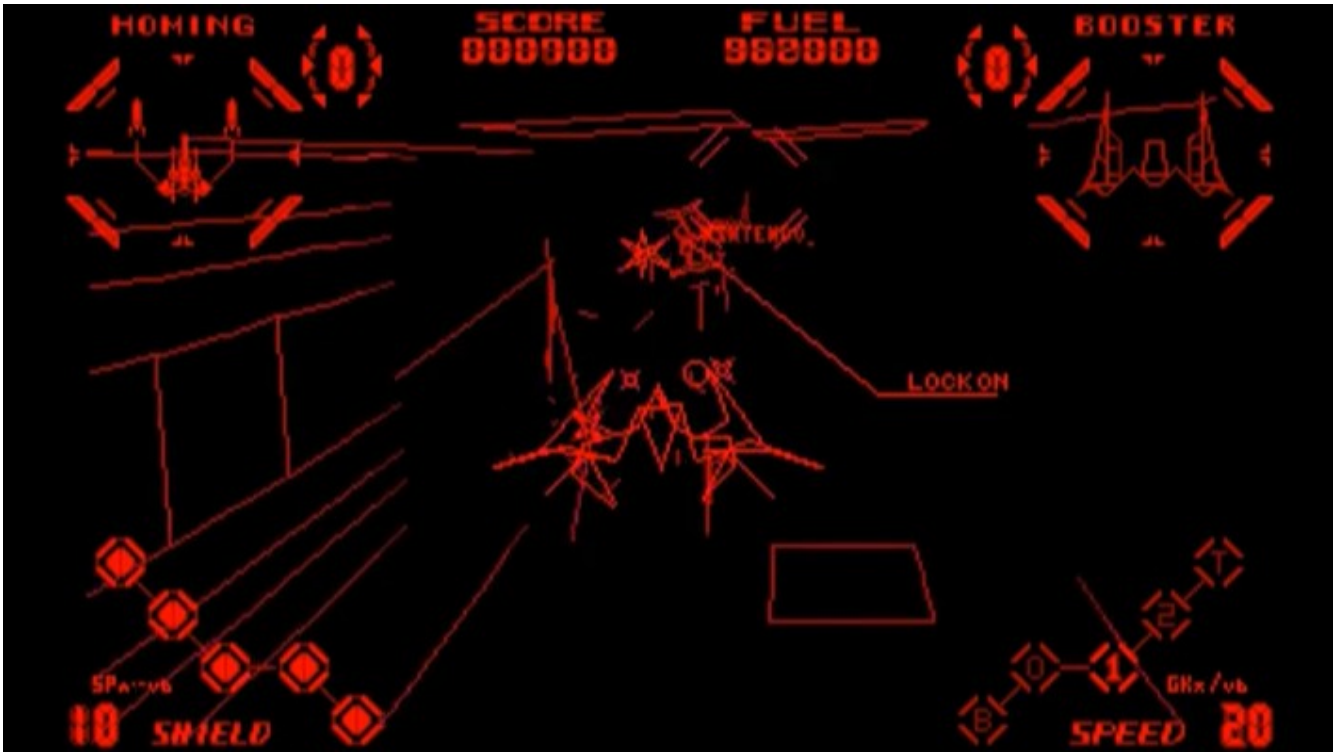
After rejections from Mattel, Hasbro, and Sega, Steve Lipsey flexed his connections in Japan through a fellow named Jack Plimpton, who served as Reflection’s professional liaison in that country. In 1991, Lipsey flew to Kyoto to pay a visit to video game behemoth Nintendo Co., Ltd.–the mother company of all worldwide Nintendo subsidiaries.

At that time, Nintendo was the largest and most successful video game maker in the world and one of the most valuable and promising companies in all of Japan. The firm, led by president Hiroshi Yamauchi, nearly owned the entire industry after the massive success of its 1983 Famicom console (released as the NES in America), and from the blockbuster handheld Game Boy, released in 1989.

Upon earlier inquiries from Plimpton, news of Reflection’s display technology had fallen across the desk of Gunpei Yokoi, the head of Nintendo’s internal R&D1 division. Yokoi had joined Nintendo in 1965, long before the video-game era. He had been responsible for numerous hit products, such as the Ultra Hand, a lattice-like toy gripping device in the 1960s, the *Game and Watch* series of handheld games in the early 1980s, and the Game Boy.

After the surprising success of the *Game and Watch* line, which played off of a boom in cheap calculator-screen technology, Yokoi took special pride to finding novel uses for mundane, inexpensive, widely adopted technology. The Game Boy continued this philosophy by utilizing a inexpensive, non-backlit monochrome LCD at a time when Nintendo’s competitors fixated on portable backlit color displays. Despite lacking color and a backlight, the Game Boy proved an astronomical hit, moving tens of millions around the world within a few years of its release.

Lipsey and Wells demonstrated the tank game demo (among other applications of their display, just in case) to engineers at Nintendo. Wells recalls an early visit to Nintendo where he gave a demo to a particularly eager and interested Japanese employee. It was only much later that Wells realized he had been sitting next to Yokoi himself. “He fell in love with the technology,” says Wells. “He pushed it. He said, ‘There’s a great product here.'”



The Virtual Boy's *Red Alarm*

Virtual Boy mastermind Gunpei Yokoi

A Personal Crossroads

The Private Eye opportunity came at an interesting time for Yokoi. In his autobiography, *Gunpei Yokoi Game Pavilion*, written in 1997 with the aid of Japanese author Takefumi Makino, he described feeling out of place in the industry in the early 1990s. The home console market, in his opinion, had turned into a technological arms race that eschewed gameplay for flashy graphics. He also felt that games were beginning to cater to a hardcore audience and did not have enough general appeal to keep Nintendo's proven mainstream audience coming back for years to come.

These feelings came at a key time for Yokoi because, just prior to the visit from Reflection, he found himself winding down from the invention business at Nintendo, which had grown too large and bureaucratically stifling for him. He had worked at the firm for 26 years, racking up many successes, and began looking for a new challenge. He laid out a plan to retire at age 50 from Nintendo; he would then found his own company where he would have more direct control over the invention process.

Then Reflection Technology showed up. Yokoi was 49 years old, and suddenly, an unexpected opportunity to move Nintendo in a new direction landed right in front of him. It put his retirement plans on hold.

Advertisement

Where others saw deficiency in the Private Eye's red-on-black display, the creative mind of Gunpei Yokoi saw a completely unexpected advantage. What struck him most about the Private Eye display was its capability to immerse a player in perfect, complete blackness. In this way, he conceived of the display as a way to project infinite depth.

If the TV screen medium has reached the limits of its potential, isn't 3D the only option?"

"The standard way to create 3D images is by using liquid crystals," wrote Yokoi in his book. "However, because liquid crystals require backlighting, even in complete darkness, a couple of percentage points of the light seeps out." LCDs did not generate true black, he explained, but LEDs, when turned off, could.

Yokoi hoped that this would lead to an entirely new type of gameplay. "The idea was to have it be in total darkness, so you would not feel the frame of the screen," he wrote. He sought a world of games that transcended the borders of a television set.

And those games, Yokoi calculated, would attract a much wider audience, bracing the company for a new era. "I have my doubts as to Nintendo's future if

it continues pursuing video games in the same way as before," he wrote. "What should be done to once again engross Famicom and Super Famicom players? If the TV screen medium has reached the limits of its potential, isn't 3D the only option?"

The bottom of a Virtual Boy prototype with a built-in version of *Space Pinball* and a hand-painted controllerPhoto: courtesy of Ben Wells

The Go-Ahead

After garnering support from several Nintendo engineers, Lipsey and Wells felt optimistic that the company would license the Private Eye for a new game console idea. But first, they had to get past Nintendo's board of directors. Lipsey recalls the alien experience of lining up in an elevator with Plimpton and Nintendo employees by business rank on the way up to the meeting room, then sitting in the proper order at the table based on status.

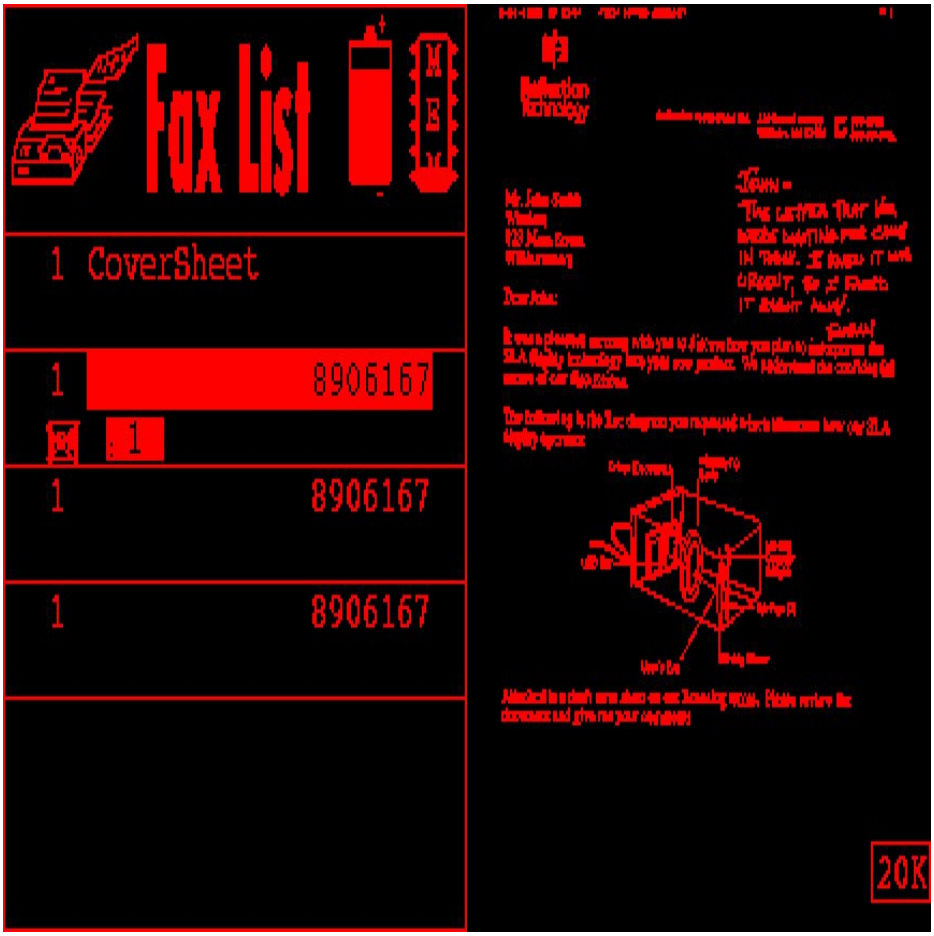
Lipsey gave his usual demonstration, which included a long slideshow of potential applications, with Jack Plimpton translating. The pair sat directly across from Nintendo Chairman Hiroshi Yamauchi. Near the end of the presentation, Lipsey heard a dull thud. He looked up and saw Yamauchi face down on the table. “His head fell on his hand, on the table, and he’s sound asleep,” recalls Lipsey. “Everybody else was just sitting there, nobody does anything.”

On the way out, Lipsey turned to Plimpton and said, “Well, that was a waste of a plane ticket to Japan.” Plimpton replied, “No, that was amazing! In Japanese business, that was the senior guy sending the message to his underlings that they could proceed. They didn’t need him to be involved anymore–the project is a go!”

Indeed, Yamauchi had the utmost confidence that his hand-picked engineers would create great things–especially his star gadget designer Yokoi. “Yamauchi tended to trust the developers more than the products,” says Yokoi biographer Makino. “I think that he trusted what Yokoi was doing after he saw him working hard to develop his ideas.”

Yamauchi gave the senior engineer the go-ahead to pursue his project. Nintendo purchased a worldwide exclusive license to the Private Eye display technology for use in video games, which included $10 million in advance royatlies, along with purchasing a minority stake in Reflection Technology. The crew at Reflection was sworn to secrecy, internally referring to the collaboration with Nintendo as “Dragon Project.”

Al Becker, Reflection’s president, was ecstatic about the Nintendo deal. It was the closest the company had come to having its displays incorporated in a shipping consumer product—a mass-market electronics device that could potentially sell in the tens of millions of units.



Reflection’s FaxView let you peek at faxes, in red and black.

Advertisement

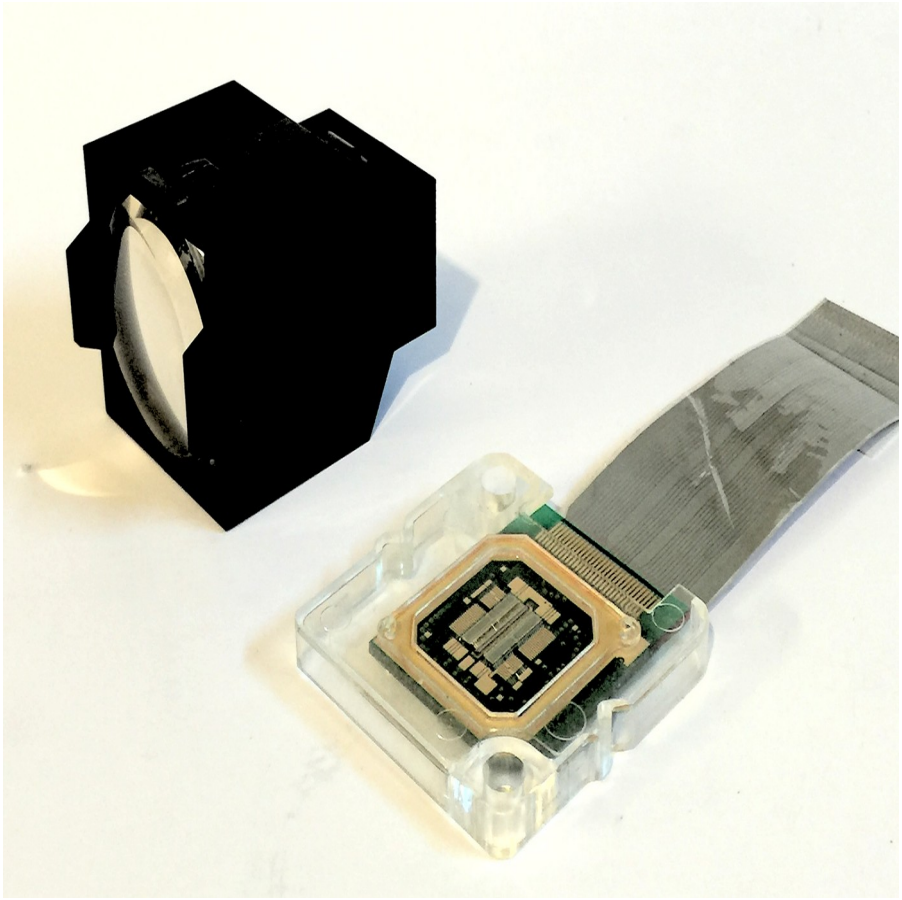
Confident that the Nintendo deal represented an almost certain route to financial success, Reflection staffed up and began exploring even more opportunities for its displays. It came up with a portable, handheld gadget called FaxView that could receive and display faxes on the go without paper. The user could view the faxes by holding the device up to their eye, where they would be presented with a tiny Private Eye display that showed the fax’s contents (in shades of red, of course).

Meanwhile, Nintendo subcontracted the construction of the console’s display assemblies to Mitsumi, and after the handoff, Ben Wells and other Reflection Technology employees spent most of their time on the Dragon Project working with Mitsumi engineers. “They picked it up and ran with it,” he says, praising the skill of the company’s technical staff.

Vision Meets Reality

Bristling with enthusiasm, Yokoi initially hoped his new gaming device would incorporate head tracking like Reflection Technology’s tank demo. “Yokoi’s first intention was to create a game console that looked like a pair of goggles,” says

Makino, who became friends with Yokoi while co-authoring his first book in 1997. “He thought about being able to put them on and walk around.”



A Virtual Boy display assemblyPhoto courtesy of Ben Wells

Development on the project, which Nintendo code-named VR32, began in earnest with mobility as an obvious end goal. Under direction from Yokoi, Nintendo’s engineers settled on a low-wattage 32-bit RISC processor from NEC. They also devised specialized helper chips to render graphics.

A major problem with the idea of making VR32 wearable, according to Makino, was that Nintendo engineers were concerned about placing a chip with high radio emissions near a user’s head, since the safety of EMF radiation on the brain had yet to be thoroughly studied. Its proximity also produced visual noise in the displays. “This meant that the internal CPU had to be covered by a metal plate,” says Makino, “which made the whole system too heavy, forcing the goggle concept to be abandoned.”

Not long after, Yokoi’s console evolved from a strap-on headset into a heavier device that one could prop up onto one’s face using a clumsy shoulder stand. Again, Nintendo’s legal department feared liability issues; the device might cause children to fall down a stairwell while playing. Reflection engineer Ben Wells also recalls a nightmare scenario where they envisioned a kid playing VR32

in the back of a car that gets into an accident. Glass and plastic shoved into children's faces was something Nintendo wanted to avoid.

More Tech History

- The Untold History Of The Invention Of The Game Cartridge
- Who Needs GPS? The Forgotten Story Of Etak's Amazing 1985 Car Navigation System
- How Two 1970s Bored Housewives Helped Create The PC Industry
- Krushchev Visits IBM: A Strange Tale Of Silicon Valley History

Hobbled by liability concerns, VR32 soon evolved into a bulky red viewport mounted to a bi-pod that rested on a table. No more attachments or headbands: People would have to hunch over the device to play. But hey–it was still in 3D.

Once in tabletop form, VR32 could have benefitted from a more powerful chipset capable of delivering fully texture-shaded polygonal, immersive 3D worlds more akin to the Nintendo 64. That would have made the system truly stand out by the time of its release. But Nintendo found itself heavily invested in the design and manufacture of custom silicon for the system, so VR32 became stuck with its battery-powered, embedded hardware roots, which proved too wimpy for any 3D experience beyond crude wireframe graphics and multiple layers of 2D sprites.

Nintendo saw this as their fourth product.

Around this time, Yokoi began to have nagging doubts about the success of the system, and those sentiments were amplified among other factions within Nintendo. “From what I heard, there were a lot of skeptical opinions raised during the development process,” says Makino. “Even Mr. Yokoi admitted that he himself felt uneasy during development. He described it as a kind of ‘hiri-hiri’ feeling. This is an onomatopoeia that only exists in Japanese, but think about it as the sort of feeling you would get when being cooked slowly over a frying pan.”

If there was skepticism at Nintendo, the company’s executives didn’t let it show to their American partner. “I can tell you that everybody was really hot on this,” recalls Wells. “The comment I heard was that Nintendo saw this as their fourth product.” (After the Famicom, Game Boy, and Super Famicom.)

As the VR32 began to assume its final shape, Nintendo’s marketing department worked on a branding campaign. Yokoi’s console became “Virtual Boy,” a name that combined “virtual reality” with the word “boy” in a way that implied an extension of Nintendo’s portable Game Boy handheld.

The choice of name would prove detrimental, as it set up inevitable comparisons with Nintendo’s absurdly successful handheld gaming device. It would have to play big or go home. There would be no second chances, and no potential of boutique status for Nintendo’s “fourth product.”

Eye Trouble

Back in the United States, Reflection continued to consult with Nintendo and Mitsumi on the Virtual Boy display. Nintendo wanted confirmation from Reflection that its technology would not harm its customers’ eyesight. Under the advice of Reflection, Nintendo hired Dr. Eli Peli of the Schepens Eye Research Institute in Boston to study the potential effects of the Virtual Boy’s display on human vision.

The Virtual Boy's disclaimers could be a tad alarming.

Peli would not directly comment on the results of his research for this article due to a NDA with Nintendo, but Wells says that the doctor found that the technology was generally harmless for eyesight–with one caveat. Children whose optic system had not yet fully developed (which happens around ages 5-7) could develop lazy eye if the two displays were misaligned vertically. So Reflection encased the Virtual Boy's displays into a rigid plastic case and precision steel frame. That way, there was no chance of that occurring.

"Far from being bad for your eyes," wrote Yokoi, "The Virtual Boy was in fact pretty good for them. But we didn't have time to properly present these findings, and so we gave up trying to include them with the product."

The warnings on the back of this Japanese edition of *Wario Land* take up about a third of the space.

Despite the generally positive result, Nintendo's legal department once again took the most cautious position and advised the inclusion of prominent warnings on the Virtual Boy's packaging, in its manual, and on additional pamphlets included with the manual. The warnings stated that the system should not be used by kids under the age of seven.

Nintendo implemented a timer that reminded users every 15 minutes to pause and rest their eyes.

In Japan, Virtual Boy's warnings ended up sounding even more severe and ominous than those in the U.S. A new Japanese law, the Product Liability Act, was

due to come into effect on July 1, 1995. The new law made companies responsible for any accidents caused by the use of their products. “Because of that law,” says Makino, “manuals suddenly had to mention a whole list of things that users shouldn’t do with them. Sometimes, these were quite silly: things like ‘Don’t dry a wet cat using this microwave.'” If an act was not specifically prohibited in the manual, the company would be responsible for the damage. “It was a very strict law,” he adds.

Because of this law, Nintendo decided to implement a built-in software timer into its games that would remind users every 15 minutes to pause and rest their eyes. The same reminder found its way into the manual. “The manual in effect became a list of ‘don’ts.'” wrote Yokoi. “The people who bought the product had no idea about the provisions of the PL Act, and so when they read the instructions, they got the image that this product was bad for your health.”

The Nintendo 64Photo: Evan Amos

Pressure To Launch

Nintendo chief Yamauchi approached 1994 with trepidation. The whole industry knew the year would see the launch of two major next-gen consoles, the Sega Saturn and the Sony PlayStation, while Nintendo’s own next-gen contender, the Ultra 64 (later renamed Nintendo 64), would not be ready until 1996.

After the Virtual Boy degraded from a wearable VR system into a tabletop oddity, Nintendo probably should have canceled the project. But with tough competition in mind, Yamauchi encouraged R&D1 to complete the Virtual Boy and ready it for

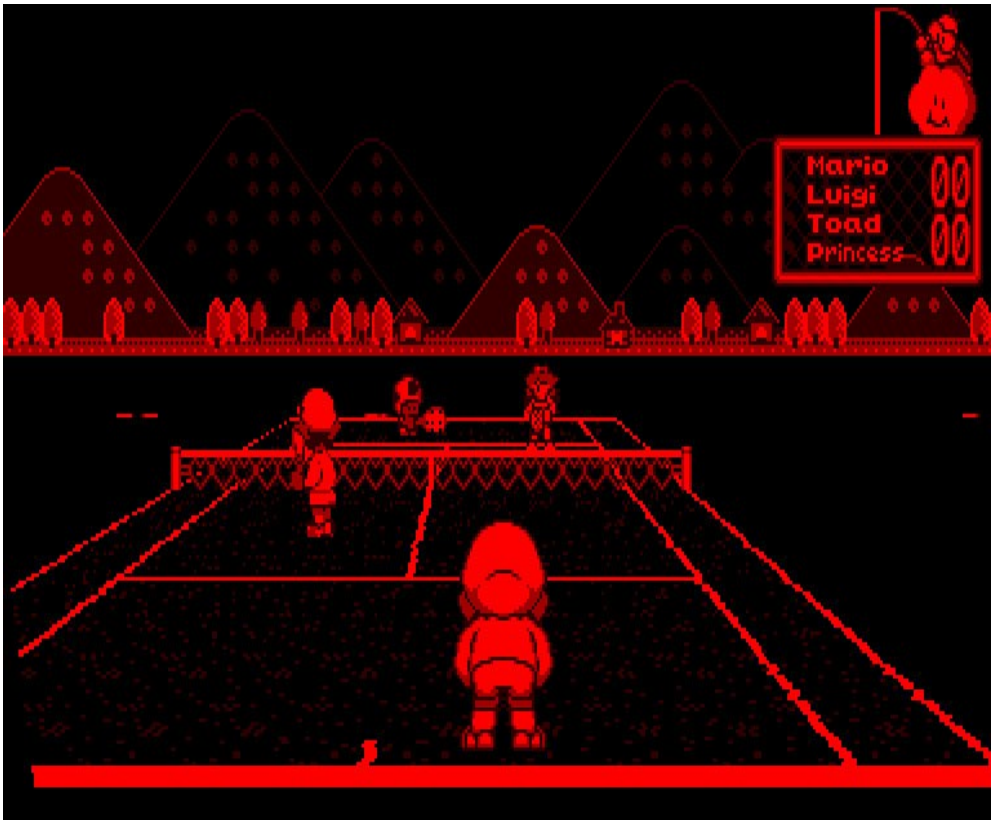
release as soon as possible to buy time prior to the launch of the Nintendo 64. “It’s clear from the people I talked to that many people in the marketing department saw the Virtual Boy as a niche system that could fill a market gap, and thus pressed to hasten its release,” says Makino.

This is not to say that the Virtual Boy was a complete afterthought–in fact, Nintendo spent considerable resources on the system, including building a plant for manufacturing the system in China (not to mention funding its development for four years).

Advertisement

The rush caused considerable tension for Yokoi’s group. In the early 1980s, Yamauchi had structured Nintendo’s three R&D groups to be developmentally isolated and internally competitive against each other. The isolation resulted in interesting breakthroughs, but the lack of cooperation between them could have detrimental effects on the company’s products.

For example, in 1994, Nintendo’s star game designer, Shigeru Miyamoto, found himself neck-deep in work on Ultra 64. This project consumed the lion’s share of Nintendo’s R&D dollars, and it made Yokoi’s new console look like a hobby project in comparison.



Mario Tennis was generic tennis, with Mario

Yokoi was instructed by Yamauchi to de-emphasize Mario on the system.

Miyamoto's support mattered, because from 1981 on, the designer had equipped Nintendo with a Disneylike cast of game characters by creating the *Mario*, *Zelda*, and *Donkey Kong* franchises. His success turned Nintendo into an intellectual property company as much as a technology one.

And yet that valuable IP would only make token appearances on Yokoi's new hardware, such as sticking Mario characters into a generic tennis game (*Mario Tennis*), or by regurgitating a 12 year-old arcade classic, *Mario Bros.*, into an awkward remake whose use of stereoscopic perspective proved entirely incidental to the gameplay (*Mario Clash*).

In fact, Yokoi was instructed by Yamauchi to de-emphasize Mario on the system, as the character was slated to make his big 3D debut on the Ultra 64. "At first, I had a large list of titles like "Mario Clash," but I was told not to release that kind of stuff," wrote Yokoi. "I guess it was an issue of disagreement on how to present the product. For me, it was a perfect game for our target users, but within the company, a lot of people strongly felt that the Virtual Boy would only appeal to a certain crowd of die-hard players."

[video – displayed the game in action]
The Virtual Boy's first game prototype, *Space Pinball*

Instead, Yokoi would have to rely on game concepts developed internally by R&D1 and by frequent R&D1 subcontractor Intelligent Systems. That firm, who had helped with the creation of *Metroid* in the Famicom era, programmed the Virtual Boy's first game, *Space Pinball*. "At first, the [entire] pinball board was drawn on the screen," writes Yokoi, "But I said, 'We're working with the Virtual Boy here … just draw the edges and make it space pinball.'"

Space Pinball became the showcase for the system; it eventually headlined the console's first appearances at trade shows (before launch, Intelligent reworked it into the commercial release *Galactic Pinball*).

Virtual Boy's Killer App?

NES had *Super Mario Bros.*, Game Boy had *Tetris*. What could have been the Virtual Boy's killer app? In my mind, one known title sticks out: *Doom*. The chance to play the groundbreaking 1993 first-person-shooter game in stereoscopic 3D could have attracted quite a few players, especially in the U.S.

I asked John Carmack, its co-creator, if Nintendo ever approached Id Software about the Virtual Boy. "No, Nintendo and Id were not friendly through the '90s," he told me. "I had an unpleasant experience developing on the SNES." During that episode, Nintendo insisted on heavy modifications and censorship on a Super NES port of *Doom*-precursor *Wolfenstein 3D*. Still, Carmack–who is now CTO of Oculus VR–is willing to muse today about the Virtual Boy's potential. "It would have been challenging to make a *Doom*-class game on that hardware," he says. "But something like *Wolf 3D* in stereo probably would have been possible."

From a distance, Reflection Technology looked on with slight nervousness as its fully immersive head-tracked tank simulator concept degraded into a stereoscopic representation of pinball in space. "Their software group just wasn't up to the task of the whole new way of thinking about games," says Lipsey. Not long before the launch, Nintendo shipped Reflection a Virtual Boy prototype with *Space Pinball* built in. It was novel and intriguing, but it was no tank simulator. Ben Wells recalls: "I would sit down and look at the pinball for a minute or two at a time and it's like, 'God, is that cool!' Then I'd go back to work."

The manual for the Japanese edition of *Wario Land* for the Virtual Boy

Ultimately, the quality of the software came down to the time Yokoi's group had to develop it. And pressures from upper management meant that shortcuts had to be taken, forcing Yokoi's software team to shoehorn known 2D gameplay techniques into a 3D world the best they could.

The Boy Leaves Home

When news of Yokoi's project first leaked out, optimism pervaded early reports about "VR32" in the press. Sega had discussed developing a VR headset for its Genesis console as early as 1991, and Atari boasted about a potential headset for is 1993 Jaguar system. In this climate, any news of VR as a new frontier for video games caught people's attention. But as word got out about the Virtual Boy's rumored all-red display and its reliance on a table stand, enthusiasm in the U.S. video-game press waned.

Trying out the Virtual Boy at the Shoshinkai Software Exhibition in 1994Photo: Nintendo

Still, it was full steam ahead for Nintendo, which first showed Virtual Boy to the public on November 15, 1994 at the Shoshinkai Software Exhibition in Harumi, Japan. Attendees could play games like *Space Pinball* and *Teleroboxer*, a boxing game. Reaction in Japan proved tepid, with a mix of astonishment at the stereoscopic technology but bewilderment about its all-red display and its target retail price, which was expected to be around U.S. $200. (At the time, the Game Boy, with a copy of *Tetris*, retailed for around $60). Nintendo boldly announced it expected to sell around 3 million Virtual Boy units in its first year on the market.

The Virtual Boy in its Japanese-market packaging

Two months later, on January 6, 1995, the Virtual Boy made its U.S. debut at the Winter CES show in Las Vegas, with another mixed and cautious response. Few large media outlets criticized the system before its release, expressing guarded optimism on behalf of the monstrously successful Nintendo. Meanwhile, the enthusiast press on the nascent web didn't pull any punches. "My biggest beef is Nintendo trying to pass this off to the public as virtual reality. It's not," wrote Michael Lambert for an early online video game fanzine after trying the Virtual Boy at CES.

That year, Nintendo shared its CES booth space with Reflection Technology, which showed off its FaxView product. Nintendo launched press releases announcing the nature of its partnership with Reflection Technology for the first time. Al Becker and the crew at Reflection could not have been more excited for the future.

Then disaster struck. In the months leading up to the Virtual Boy's launch in Japan, the media there seized onto Nintendo's health and eyesight warnings and sensationalized them, implying that the Virtual Boy was definitely bad for players' eyes. The attack came at a time when video games in general found themselves under fire from the Japanese establishment. Between that and the health warnings, Makino says, "Even if a child wanted a Virtual Boy, his or her dad was more likely to buy a PlayStation for Christmas."

It should be no surprise then, that when the Virtual Boy launched in Japan on July 21, 1995, the system was met with little enthusiasm. Unlike the Super Famicom, which had seen shoppers line up on the street waiting to buy a system, no one lined up for the Virtual Boy.

[https://www.youtube.com/watch?v=hUWiL4M0OmU]
A Japanese ad for the Virtual Boy

Luckily for Nintendo of America, the American press had not piled on the Virtual Boy for health reasons, so when it launched on August 21, 1995 for $179.95, sales seemed brisk at first. In the U.S, Nintendo had partnered with Blockbuster to rent out Virtual Boy systems so people could try it for themselves, a unique strategy to get around the difficultly of conveying the system's 3D effect in print and TV advertising.

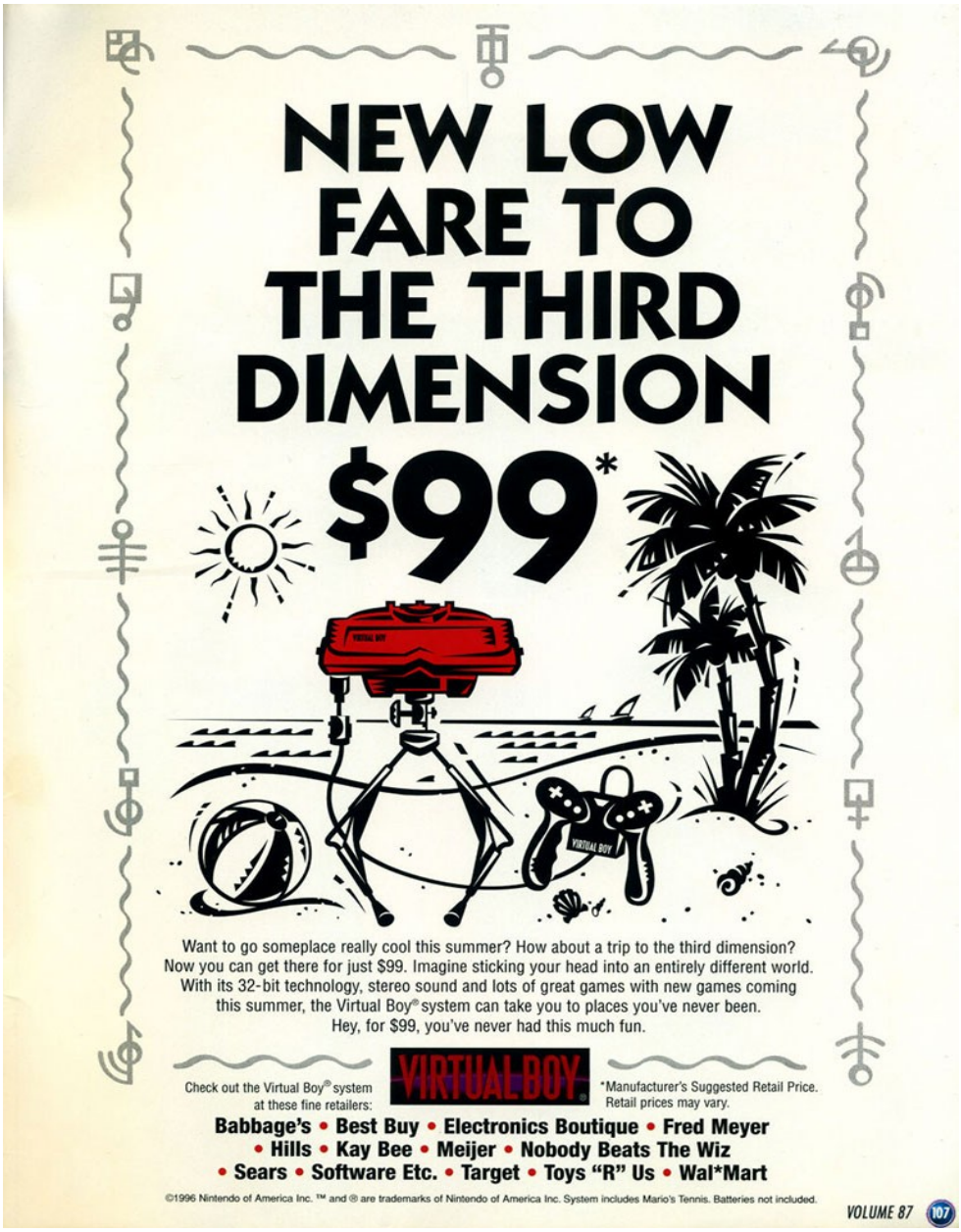
Advertisement

During its fall launch window, the Virtual Boy actually outsold the Sega Saturn, according to Peter Main, Nintendo of America's VP of marketing, as quoted in David Sheff's *Game Over: Press Start to Continue*. This was apparently not good enough for Nintendo, because they lowered the system's price by $20 to $159.95 on October 18.

Give me one billion yen to market it, and I will launch the Virtual Boy into the stratosphere.

Meanwhile, in Japan, things were looking dim for the system. By December, it had sold only 140,000 units in its home country, a deeply embarrassing failure by Nintendo standards. On December 22, 1995, Yamauchi decided to pull the plug on the Virtual Boy in Japan–only six months after its release–so as to not expend any more money on an obvious flop.

"What [Yokoi] really regretted was the fact that he hadn't managed to develop a new, completely different type of video game," says Makino. Yokoi blamed the failure on various factors, from unfair press coverage, to misunderstandings from hardcore video game players, to the awkward form factor. Foremost, he blamed Nintendo in Japan for not doing enough to market the system there, later saying he told his colleagues at Nintendo, "Give me one billion yen to market it, and I will launch the Virtual Boy into the stratosphere." One billion yen would have been about $10 million U.S. at the time, a pittance for Nintendo.


NEW LOW FARE TO THE THIRD DIMENSION
$99*
Want to go someplace really cool this summer? How about a trip to the third dimension? Now you can get there for just $99. Imagine sticking your head into an entirely different world. With its 32-bit technology, stereo sound and lots of great games with new games coming this summer, the Virtual Boy® system can take you to places you've never been. Hey, for $99, you've never had this much fun.
Check out the Virtual Boy® system at these fine retailers:
VIRTUAL BOY
*Manufacturer's Suggested Retail Price. Retail prices may vary.
Babbage's • Best Buy • Electronics Boutique • Fred Meyer • Hills • Kay Bee • Meijer • Nobody Beats The Wiz • Sears • Software Etc. • Target • Toys "R" Us • Wal*Mart
©1996 Nintendo of America Inc. ™ and ® are trademarks of Nintendo of America Inc. System includes Mario's Tennis. Batteries not included.
VOLUME 87
107
Nintendo kept cutting the Virtual Boy's price.

Since Virtual Boy had fared better in the U.S., Nintendo of America decided to keep it on the roster a while longer to see if it could build up any momentum. It was not to be. Demand diminished, and NOA dropped the price to $99 in May 1996. After a showing at E3 1996, Nintendo dropped mention of the Virtual Boy from its marketing plans, and in August of that year, it officially pulled the plug once and for all.

By late 1996, Virtual Boy began showing up in the clearance aisles of toy stores like Toys "R" Us for $30 or less. Back in Massachusetts, Reflection Technology reeled at the turn of events. "We were all shocked when it tanked," recalls Wells. Most shocked of all was Allen Becker, who had essentially bet the company on the success of the Virtual Boy.

A Sad Coda

The downfall of Virtual Boy threw a wrench, once again, into Gunpei Yokoi's retirement. "Yokoi's plan was to have the Virtual Boy become a hit, then to help build up Nintendo's main products into three categories: consoles, mobiles, and wearables," says Makino, who has written two books on the inventor. "Then, he wanted to leave the company."

According to Makino, Nintendo president Yamauchi didn't lash out at Yokoi for the failure of the Virtual Boy. "When it failed, he just withdrew the product quickly, and didn't try to pin the blame on Mr. Yokoi," says Makino. But Yamauchi expected people to take responsibility for their mistakes. "I think that Mr. Yokoi felt this, which is why he tried to make up his failure on the Virtual Boy with another product," says Makino. That product would become the Game Boy Pocket, a vastly smaller, lighter, and less power-hungry version of Yokoi's hit handheld (with a better display to boot). It shipped in 1996 to broad acclaim. After that, it was time to move on.

Marketing materials for Koto Laboratory, Yokoi’s post-Nintendo startup

Both American and Japanese press could not help but link Yokoi’s departure to the failure of the Virtual Boy.

Yokoi tendered his resignation on August 16, 1996, after nearly 31 years with Nintendo, and four years after he originally planned to do so. In a country where employees typically remained loyal to a company for their entire working life, his departure shocked the industry. Both American and Japanese press could not help but link his departure to the commercial failure of the Virtual Boy. Even the chairman of Nintendo of America, Howard Lincoln, fell under the impression that Yokoi left in regret over Virtual Boy, and he openly lamented the loss of such a great talent.

“Yokoi was very troubled by these reports, which were all based on misunderstandings,” says Makino, who witnessed Yokoi’s discomfort in person not long afterward. At the time, Yokoi denied the claims to those who asked, but kept a relatively low profile in the press because he was hard at work on his post-Nintendo project.

Bandai’s WonderSwan, released after Yokoi’s deathPhoto: Evan Amos

One month after leaving Nintendo, Yokoi founded a company called Koto Laboratory, along with Yoshihiro Taki, an R&D1 colleague who had left at around the same time. Yokoi threw himself into his new gig with great enthusiasm, working on a new series of LCD keychain games and even a new handheld game console, a monochrome unit that ran off of a single AA battery. It would later be sold to Bandai and released as the WonderSwan, exclusive to Japan.

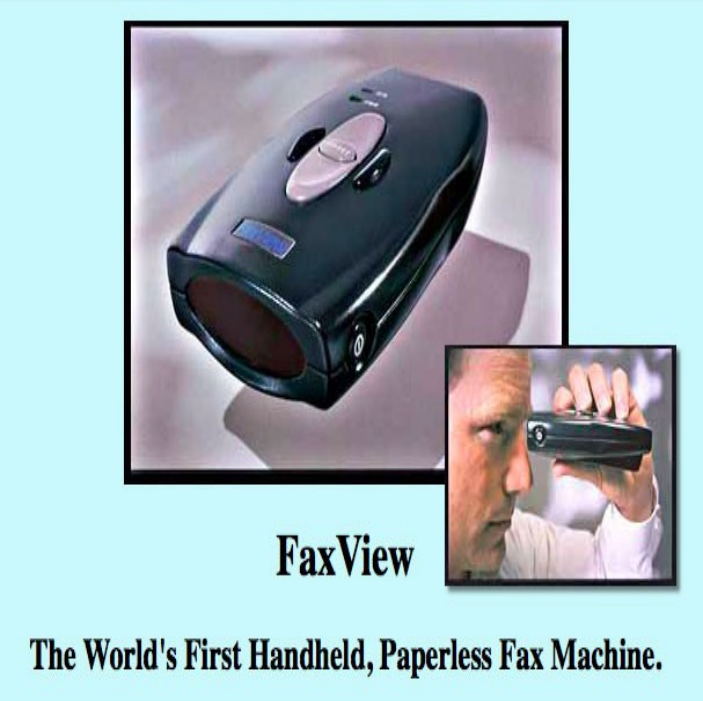
Tragically, Yokoi did not get to enjoy his career rebirth for long. On October 4, 1997–just over a year after he left Nintendo–he was involved in a minor traffic accident on a highway 200 miles north of Tokyo. As he and the driver of the car

exited the vehicle to inspect the damage, another car sped by and struck Yokoi, killing him. He was 56 years old.

A young member of the next generation gives the Virtual Boy a try. Photo: Benj Edwards

Because the failure of the Virtual Boy, Yokoi's resignation, and his death all happened in just over two years, the three events came to be linked in people's minds. By extension, the console almost took the blame for his passing, since one could imagine that he might not have been in that car that day if he had still worked at Nintendo. Howard Lincoln said as much to Andy Eddy in the extended chapters of *Game Over*, revised in 1999.

This point of view is based on a flawed assumption. Yokoi had planned to leave Nintendo all along. Shortly before his death, he was happy with the path he had chosen. He had invented his dreams, and was on his way to invent more.



FaxView, the only consumer device other than the Virtual Boy to incorporate Reflection's display technology

While Nintendo was an enormous company that could easily absorb the losses from a dud like the Virtual Boy, its failure proved financially devastating for Reflection Technology, which had hoped to parlay the system into an IPO. FaxView went into production in late 1995, but it failed to take off, so the firm sought more investments and hunkered down into research mode. Around 1997, the company announced it was working on a full-color version of the Private Eye display called the P7, but it ran out of money before completing the project.

Ever restless, founder Al Becker soon moved on to another venture involved with water purification technology for developing nations. This quest was cut short when, on October 14, 2001, he died unexpectedly at his home of a ruptured artery while watching TV. He was 53.

In the end, the Private Eye display only made it into two consumer products: the Virtual Boy and the FaxView. But along the way, it helped kick-start the concepts of wearable computing and augmented reality and captured the imagination of one of the world's foremost toy inventors. It also powered the first and only natively stereoscopic video game system—a remarkably forward-thinking accomplishment given that it's taken another two decades for Oculus Rift, Sony's Project Morpheus, and HTC's Vive to return to the idea.

For both Yokoi and Becker, the flawed brilliance of the Virtual Boy is part of an impressive legacy—daring launch, stunning failure, and all.